Name ____________________ Date ________ Class ________

LESSON 7-3

Practice A

Triangle Similarity: AA, SSS, SAS

Fill in the blanks to complete each postulate or theorem.

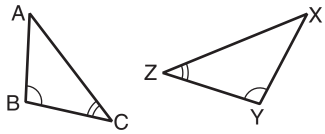
1. If the three sides of one triangle are ____________________ to the three sides of another triangle, then the triangles are similar.

2. If two sides of one triangle are proportional to two sides of another triangle and their included angles are congruent, then the triangles are ____________________.

3. If two angles of one triangle are ____________________ to two angles of another triangle, then the triangles are similar.

Name two pairs of congruent angles in Exercises 4 and 5 to show that the triangles are similar by the Angle-Angle (AA) Similarity Postulate.

4.



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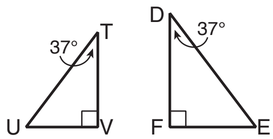
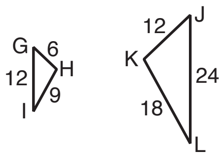
5.



____

Substitute side lengths into the ratios in Exercise 6. If the ratios are equal, the triangles are similar by the Side-Side-Side (SSS) Similarity Theorem.

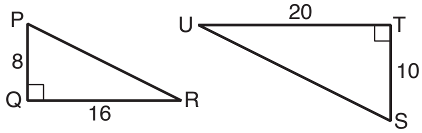
6.



$\frac{GH}{JK}$ = ________ = ________ $\frac{HI}{KL}$ = ________ = ________ $\frac{GI}{JL}$ = ________ = ________

Name one pair of congruent angles and substitute side lengths into the ratios in Exercise 7. If the ratios are equal and the congruent angles are in between the proportional sides, the triangles are similar by the Side-Angle-Side (SAS) Similarity Theorem.

7.



congruent angles: ____________ $\frac{PQ}{ST}$ = ________ = ________ $\frac{QR}{TU}$ = ________ = ________

LESSON 7-3

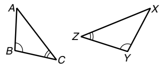
Practice A

Triangle Similarity: AA, SSS, SAS

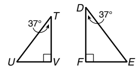
Fill in the blanks to complete each postulate or theorem.

1. If the three sides of one triangle are **proportional** to the three sides of another triangle, then the triangles are similar.
2. If two sides of one triangle are proportional to two sides of another triangle and their included angles are congruent, then the triangles are **similar**.
3. If two angles of one triangle are **congruent** to two angles of another triangle, then the triangles are similar.

Name two pairs of congruent angles in Exercises 4 and 5 to show that the triangles are similar by the Angle-Angle (AA) Similarity Postulate.

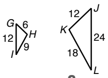
4. 

$\angle B \cong \angle Y$; $\angle C \cong \angle Z$

5. 

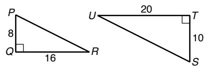
$\angle F \cong \angle V$; $\angle D \cong \angle T$

Substitute side lengths into the ratios in Exercise 6. If the ratios are equal, the triangles are similar by the Side-Side-Side (SSS) Similarity Theorem.

6. 

$\frac{GH}{JK} = \frac{6}{12} = \frac{1}{2}$ $\quad \frac{HI}{KL} = \frac{9}{18} = \frac{1}{2}$ $\quad \frac{GI}{JL} = \frac{12}{24} = \frac{1}{2}$

Name one pair of congruent angles and substitute side lengths into the ratios in Exercise 7. If the ratios are equal and the congruent angles are in between the proportional sides, the triangles are similar by the Side-Angle-Side (SAS) Similarity Theorem.

7. 

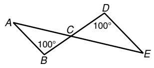
congruent angles: $\angle Q \cong \angle T$ $\quad \frac{PQ}{ST} = \frac{8}{10} = \frac{4}{5}$ $\quad \frac{QR}{TU} = \frac{16}{20} = \frac{4}{5}$

LESSON 7-3

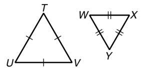
Practice B

Triangle Similarity: AA, SSS, SAS

For Exercises 1 and 2, explain why the triangles are similar and write a similarity statement.

1. 

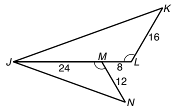
Possible answer: $\angle ACB$ and $\angle ECD$ are congruent vertical angles. $m\angle B = m\angle D = 100°$, so $\angle B \cong \angle D$. Thus, $\triangle ABC \sim \triangle EDC$ by AA $\sim$.

2. 

Possible answer: Every equilateral triangle is also equiangular, so each angle in both triangles measures 60°. Thus, $\triangle TUV \sim \triangle WXY$ by AA $\sim$.

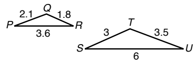
For Exercises 3 and 4, verify that the triangles are similar. Explain why.

3. $\triangle JLK$ and $\triangle JMN$



Possible answer: It is given that $\angle JMN \cong \angle L$. $\frac{KL}{MN} = \frac{JL}{JM} = \frac{4}{3}$. Thus, $\triangle JLK \sim \triangle JMN$ by SAS $\sim$.

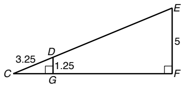
4. $\triangle PQR$ and $\triangle UTS$



Possible answer: $\frac{PQ}{UT} = \frac{QR}{TS} = \frac{PR}{US} = \frac{3}{5}$. Thus, $\triangle PQR \sim \triangle UTS$ by SSS $\sim$.

For Exercise 5, explain why the triangles are similar and find the stated length.

5. DE



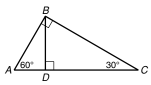
Possible answer: $\angle C \cong \angle C$ by the Reflexive Property. $\angle CGD$ and $\angle F$ are right angles, so they are congruent. Thus, $\triangle CDG \sim \triangle CEF$ by AA $\sim$. $DE = 9.75$

LESSON 7-3

Practice C

Triangle Similarity: AA, SSS, SAS

Use the figure for Exercises 1–3.

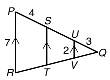


1. Prove similarity relationships between triangles in the figure. Give a similarity ratio for each relationship you find.

Possible answer: $\triangle ABC$ and $\triangle ADB$ share $\angle A$. They also each have a right angle, so $\triangle ABC \sim \triangle ADB$ by AA $\sim$. They have a similarity ratio of $\frac{2}{1}$. $\triangle ABC$ and $\triangle BDC$ share $\angle C$. They also each have a right angle, so $\triangle ABC \sim \triangle BDC$ by AA $\sim$. They have a similarity ratio of $\frac{2\sqrt{3}}{3}$ to 1. By the Transitive Property of Similarity, $\triangle ADB \sim \triangle BDC$. They have a similarity ratio of $\frac{\sqrt{3}}{3}$ to 1.

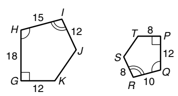
2. $AD = 1$ and $DC = 3$. Find the perimeter of $\triangle ABC$. $\quad 6 + 2\sqrt{3}$

3. Use the similarity ratios you found in Exercise 1 and the answer to Exercise 2 to find the perimeters of $\triangle ADB$ and $\triangle BDC$. $\quad 3 + \sqrt{3}$; $3 + 3\sqrt{3}$



4. Find ST. $\quad \frac{13}{3}$

5. Use triangle similarity to prove that $GHIJK \sim PQRST$.

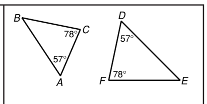
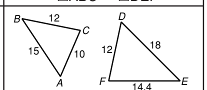
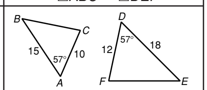


Possible answer: Draw diagonals $\overline{HK}$, $\overline{HJ}$, $\overline{QS}$, and $\overline{QT}$. $\angle G$ and $\angle P$ are right angles, so they are congruent. $\frac{GK}{PT} = \frac{GH}{PQ} = \frac{3}{2}$, so $\triangle GHK \sim \triangle PQT$ by SAS$\sim$. It is given that $\angle I \cong \angle R$. $\frac{HI}{QR} = \frac{IJ}{RS} = \frac{3}{2}$, so $\triangle HIJ \sim \triangle QRS$ by SAS$\sim$. Because $\triangle GHK \sim \triangle PQT$, $\frac{HK}{QT} = \frac{3}{2}$ and $\angle GHK \cong \angle PQT$. Because $\triangle HIJ \sim \triangle QRS$, $\frac{HJ}{QS} = \frac{3}{2}$ and $\angle IHJ \cong \angle RQS$. It is given that $\angle H \cong \angle Q$. So by the Angle Addition Postulate, $\angle KHJ \cong \angle TQS$. $\frac{HK}{QT} = \frac{HJ}{QS} = \frac{3}{2}$, so $\triangle KHJ \sim \triangle TQS$ by SAS$\sim$. Because $\triangle KHJ \sim \triangle TQS$, $\frac{JK}{ST} = \frac{HK}{QT} = \frac{3}{2}$. All the corresponding angles are congruent; all the corresponding sides are proportional. Thus, $GHIJK \sim PQRST$ by the definition of similar polygons.

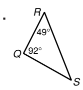
LESSON 7-3

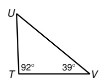
Review for Mastery

Triangle Similarity: AA, SSS, and SAS

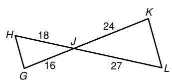
Angle-Angle (AA) Similarity	If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.	 $\triangle ABC \sim \triangle DEF$
Side-Side-Side (SSS) Similarity	If the three sides of one triangle are proportional to the three corresponding sides of another triangle, then the triangles are similar.	 $\triangle ABC \sim \triangle DEF$
Side-Angle-Side (SAS) Similarity	If two sides of one triangle are proportional to two sides of another triangle and their included angles are congruent, then the triangles are similar.	 $\triangle ABC \sim \triangle DEF$

Explain how you know the triangles are similar, and write a similarity statement.

1. 

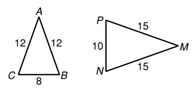


$\angle Q \cong \angle T$ by the Def. of $\cong$ ∡s. By the $\triangle$ Sum Thm., $m\angle S = 39°$ and $m\angle U = 49°$, so $\angle S \cong \angle V$ and $\angle R \cong \angle U$. $\triangle QRS \sim \triangle TUV$ by AA $\sim$.

2. 

$\angle HJG \cong \angle LJK$ by the Vert. ∡s Thm. $\frac{HJ}{LJ} = \frac{GJ}{KJ} = \frac{2}{3}$. $\triangle GHJ \sim \triangle KLJ$ by SAS $\sim$.

3. Verify that $\triangle ABC \sim \triangle MNP$.



$\frac{AB}{MN} = \frac{BC}{NP} = \frac{CA}{PM} = \frac{4}{5}$. $\triangle ABC \sim \triangle MNP$ by SSS $\sim$.